CLAIMS

1. A method for modulating spontaneous differentiation of a stem cell, which method comprises incubating the stem cell in the presence of an agonist of a LPL receptor.

2. A method for modulating spontaneous differentiation of a stem cell, which method comprises incubating the stem cell in the presence of a ligand of a class III tyrosine kinase receptor.

3. A method for modulating spontaneous differentiation of a stem cell, which method comprises incubating the stem cell in the presence of an agonist of a LPL receptor and a ligand of a class III tyrosine kinase receptor.

4. A method according to claim 1 wherein the modulation is inhibition of differentiation.

5. A method according to claim 1 wherein the LPL receptor is selected from the group consisting of S1P1, S1P2, S1P3.

6. A method according to claim 1 wherein the agonist is a phospholipid.

7. A method according to claim 6 wherein the agonist is selected from the group consisting of S1P, dihydro S1P, LPA, PAF and SPC or functional equivalents thereof.

8 A method according to claim 7 wherein the agonist is S1P or functional equivalent thereof.

9. A method according to claim 7 wherein the agonist is dihydro S1P or functional equivalent thereof.

10. A method according to claim 2 wherein the tyrosine kinase receptor is PDGFR-α or PDGFR-β.

11. A method according to claim 2 wherein the ligand is a PDGF or functional equivalent thereof.

12. A method according to claim 11 wherein the PDGF is PDGFaa, PDGFab or PDGFbb.

13. A method according to claim 1 comprising use of TNF alpha, NGF (nerve growth factor),a muscarinic acetylcholine agonist, or a serum or phorbol ester.

14. A method according to claim 1 wherein the stem cell is derived from foetal tissue or adult tissue.

15. A method according to claim 14 wherein the stem cell is an ES cell.

16. A method according to claim 14 wherein the stem cell is a hES cell.

17. A serum free or substantially serum free medium useful for modulating spontaneous differentiation of a stem cell, comprising an agonist of a LPL receptor.

18. A serum free or substantially serum free medium useful for modulating spontaneous differentiation of a stem cell, comprising a ligand of a class III tyrosine kinase receptor.

19. A serum free or substantially serum free medium useful for modulating spontaneous differentiation of a stem cell, comprising an agonist of a LPL receptor and a ligand of a class III tyrosine kinase receptor.

20. A medium according to claim 17 wherein the modulation is inhibition of differentiation.

21. A medium according to claim 17 wherein the medium is serum free.

22. A medium according to claim 17 wherein the LPL receptor is selected from the group consisting of S1P1, S1P2, S1P3.

23. A medium according to claim 17 wherein the agonist is a phospholipid.

24. A medium according to claim 23 wherein the agonist is selected from the group consisting of S1P, dihydro S1P, LPA, PAF and SPC.or functional equivalents thereof.

25 A medium according to claim 24 wherein the agonist is S1P or functional equivalent thereof.

26. A medium according to claim 24 wherein the agonist is dihydro S1P or functional equivalent thereof.

27. A medium according to claim 18 wherein the tyrosine kinase receptor is PDGFR-α or PDGFR-β.

28. A medium according to claim 18 wherein the ligand is a PDGF or functional equivalent thereof.

29. A medium according to claim 28 wherein the PDGF is PDGFaa, PDGFab or PDGFbb.

30. A medium according to claim 19 comprising TNF alpha, NGF (nerve growth factor), a muscarinic acetylcholine agonist, or a serum or phorbol ester.

31. A medium according to claim 19 wherein the stem cell is derived from foetal tissue or adult tissue.

32. A medium according to claim 31 wherein the stem cell is an ES cell.

33. A medium according to claim 31 wherein the stem cell is a hES cell.

34. A medium according to claim 17 wherein the base medium is a standard serum free medium.

35. A medium according to claim 17 comprising 25mM Hepes.

36. A medium according to claim 34 wherein the base medium is based on DMEM supplemented with insulin, transferrin and selenium.

37. A medium according to claim 17 or wherein the agonist is S1P and is present in the medium at a concentration of from 0.1 μM to 10μM.

38. A medium according to claim 17 wherein the agonist is present in the medium at a concentration of about 10μM.

39. A medium according to claim 18 wherein the ligand is present in the medium at a concentration of from 1 ng/ml to 20ng/ml where the ligand is either PDGFaa, PDGFab or PDGFbb.

40. A medium according to claim 18 wherein the ligand is present in the medium at a concentration of 20 ng/ml.

41. Use of the medium of claim 17 in propagating stem cells, preferably human embryonic stem cells, in an undifferentiated state.

42. A stem cell grown and/or maintained in a cell culture medium according to claim 17.

43. A stem cell derived from the stem cell according to claim 42.

44. A stem cell that is at least partially differentiated derived from the stem cell according to claim 43.

45. A method of treating or preventing a disorder of stem cell differentiation comprising administering to an animal in need thereof a composition containing an agonist of a LPL receptor.

46. A method of treating or preventing a disorder of stem cell differentiation comprising administering to an animal in need thereof a composition containing a ligand of a class III tyrosine kinase receptor.

47. A method of treating or preventing a disorder of stem cell differentiation comprising administering to an animal in need thereof a composition containing an agonist of a LPL receptor and a ligand of a class III tyrosine kinase receptor.

48. A method according to claim 45 wherein the modulation is inhibition of differentiation.

49. A method according to claim 45 wherein the LPL receptor is selected from the group consisting of S1P1, S1P2, S1P3.

50. A method according to claim 45 wherein the agonist is a phospholipid.

51. A method according to claim 45 wherein the agonist is selected from the group consisting of S1P, dihydro S1P, LPA, PAF and SPC or functional equivalents thereof.

52. A method according to claim 51 wherein the agonist is S1P or functional equivalent thereof.

53. A method according to claim 51 wherein the agonist is dihydro S1P or functional equivalent thereof.

54. A method according to claim 46 wherein the tyrosine kinase receptor is PDGFR-α or PDGFR-β.

55. A method according to claim 46 wherein the ligand is a PDGF or functional equivalent thereof.

56. A method according to claim 55 wherein the PDGF is PDGFaa, PDGFab or PDGFbb.

57. A method according to claim 45 comprising use of TNF alpha, NGF (nerve growth factor), a muscarinic acetylcholine agonist, or a serum or phorbol ester.

58. A method according to claim 45 wherein the stem cell is derived from foetal tissue or adult tissue.

59. A method according to claim 58 wherein the stem cell is an ES cell.

60. A method according to claim 58 wherein the stem cell is a hES cell.

61. A pharmaceutical composition comprising a class III tyrosine kinase receptor ligand and/or a LPL receptor agonist.

62. A pharmaceutical composition according to claim 61 comprising TNF alpha, NGF (nerve growth factor), a muscarinic acetylcholine agonist, or a serum or phorbol ester.

63. A method of producing a population of proliferating undifferentiated stem cells from a stem cell which method comprises incubating the stem cell in the presence of an agonist of a LPL receptor.

64. A method of producing a population of proliferating undifferentiated stem cells from a stem cell which method comprises incubating the stem cell in the presence of a ligand of a class III tyrosine kinase receptor.

65. A method of producing a population of proliferating undifferentiated stem cells from a stem cell which method comprises incubating the stem cell in the presence of an agonist of a LPL receptor and a ligand of a class III tyrosine kinase receptor

66. A method according to claim 63 wherein the LPL receptor is selected from the group consisting of S1P1, S1P2 and S1P3.

67. A method according to claim 63 wherein the agonist is a phospholipid.

68. A method according to claim 63 wherein the agonist is selected from the group consisting of S1P, dihydro S1P, LPA, PAF and SPC or functional equivalents thereof.

69. A method according to claim 68 wherein the agonist is S1P or functional equivalent thereof.

70. A method according to claim 68 wherein the agonist is dihydro S1P or functional equivalent thereof.

71. A method according to claim 64 wherein the ligand is a PDGF or functional equivalent thereof.

72. A method according to claim 64 wherein the tyrosine kinase receptor is PDGFR-α or PDGFR-β.

73. A method according to claim 71 wherein the PDGF is PDGFaa, PDGFab or PDGFbb.

74. A method according to claim 64 comprising use of TNF alpha, NGF (nerve growth factor), a muscarinic acetylcholine agonist, or a serum or phorbol ester.

75. A method according to claim 64 wherein the stem cell is derived from foetal tissue or adult tissue.

76. A method according to claim 75 wherein the stem cell is an ES cell.

77. A method according to claim 75 wherein the stem cell is a hES cell.

78. A population of undifferentiated stem cells produced by at least one of the methods according to claim 63 or using a substantially serum free medium useful for modulating spontaneious differentiation of a stem cell, comprising an agonist of LPL receptor.

79. Use of an agonist of a LPL receptor for modulating spontaneous differentiation of a stem cell.

80. Use of a ligand of a class III tyrosine kinase receptor in modulating spontaneous differentiation of a stem cell.

81. Use of a ligand of an agonist of a LDL receptor and a class III tyrosine kinase receptor in modulating spontaneous differentiation of a stem cell

82. Use according to claim 79 wherein the LPL receptor is selected from the group consisting of S1P1, S1P2 and S1P3.

83. Use according to claim 79 wherein the agonist is a phospholipid.

84. Use according to claim 79 wherein the agonist is selected from the group consisting of S1P, dihydro S1P, LPA, PAF and SPC or functional equivalents thereof.

85. Use according to claim 84 wherein the agonist is S1P or functional equivalent thereof.

86. Use according to claim 84 wherein the agonist is dihydro S1P or functional equivalent thereof.

87. Use according to claim 80 wherein the ligand is a PDGF or functional equivalent thereof.

88. Use according to claim 80 wherein the tyrosine kinase receptor is PDGFR-α or PDGFR-β.

89. Use according to claim 87 wherein the PDGF is PDGFaa, PDGFab or PDGFbb .

90. Use according to claim 79 wherein the stem cell is derived from foetal tissue or adult tissue.

91. Use according to claim 90 wherein the stem cell is an ES cell.

92. Use according to claim 90 wherein the stem cell is a hES cell.

93. Use of an agonist of a LPL receptor in producing a population of proliferating undifferentiated stem cells from a stem cell.

94. Use of a ligand of a class III tyrosine kinase receptor in producing a population of proliferating undifferentiated stem cells from a stem cell

95. Use of an agonist of a LPL receptor and a ligand of a class III tyrosine kinase receptor in producing a population of proliferating undifferentiated stem cells from a stem cell.

96. Use of a composition containing an agonist of a LPL receptor in a method of treating or preventing a disorder of stem cell differentiation.

97. Use of a composition containing a ligand of a class III tyrosine kinase receptor in a method of treating or preventing a disorder of stem cell differentiation.

98. Use of a composition containing a ligand of a class III tyrosine kinase receptor in a method of treating or preventing a disorder of stem cell differentiation

99. A method of identifying a compound capable of modulating spontaneous differentiation of a stem cell, which method comprises

exposing a LPL receptor to a test compound; and

determining binding of the test compound to the LPL receptor.

100. A method of identifying a compound capable of modulating spontaneous differentiation of a stem cell, which method comprises

exposing a ligand of a class III tyrosine kinase receptor to a test compound; and

determining binding of the test compound to the tyrosine kinase receptor.

101. A method according to claim 99 wherein the modulation is inhibition of differentiation

102. A method according to claim 99 wherein the LPL receptor is selected from the group consisting of S1P1, S1P2, S1P3.

103. A method according to claim 100 wherein the tyrosine kinase receptor is a PDGF receptor.

104. A method according to claim 103 wherein the PDGF receptor is PDGFR-α or PDGFR-β.

105. A method according to claim 103 wherein the PDGF is PDGFaa, PDGFab or PDGFbb.

106. A method according to claim 99 wherein the stem cell is derived from foetal tissue or adult tissue.

107. A method according to claim 106 wherein the stem cell is an ES cell.

108. A method according to claim 106 wherein the stem cell is a hES cell.